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PROVISIONAL SPECIFICATION.

A New Beverage.

I, FRIEDRICH SAUER of 35[I] Kolonnen Strasse Schoneberg near Berlin, Germany, Doctor of Philosophy do hereby declare the nature of this invention to be as follows :—

My invention relates to the production of a beverage fermented by means of wine yeast, which I term "malt wine" prepared principally from malt wort and a description of sugar which is readily fermented by wine yeast.

Such beverage becomes by storage identical in flavour and aroma with sweet or liqueur wines.

Instead of malt may be employed a substitute having equivalent yeast nourishing qualities.

As maltose, after attaining a certain percentage of alcohol, only continues to ferment to an insufficient degree, it is necessary to add a description of sugar that ferments to a high degree with wine yeast in order to attain an alcoholic strength of about 12 volume *per cent.* and above, as is required by the character of most sweet wines and the beverage in question, even for manufacturing reasons.

By adding the total quantity of sugar to the malt wort before fermentation when already concentrated to the degree required for the sufficient nourishment of the yeast and for the required flavor and nourishing quality of the beverage, this is made to contain so much extract that the fermentation subsides more quietly without attaining the hurtful alcoholic strength.

On this account the sugar is added by degrees before and also during the fermentation, in order to strengthen this again after each addition.

Cane sugar offers no difficulties in the fermentation even without previous inversion.

For the protection of an energetic fermentation against subsidiary fermentation there is effected in the malt wort, in place of the use of hops as in brewing a pure lactic acid fermentation at about 50° C., as in the modern distilling process, with or without subsequent addition of pure fruit acids, such as lemon, wine and apple acids.

The wine yeast added to the cooled wort thus prepared should be produced as pure as possible ; the source from which it is made determines the variety of wine aroma produced. Other wine yeast may however also be used.

The strong malt flavor and aroma existing after the completion of the fermentation in the fiery sweet beverage which has a vinous odour, disappears on storage in contact with air or oxygen, and is replaced by a nutty or bread flavor which is characteristic of nearly all sweet wines and of the beverage in question.

The high percentage of alcohol of the beverage, being about 12 volume *per cent.* and above, and the storage thereof in ample contact with atmospheric air or oxygen are necessary for the production of the above named properties, without which the flavor and aroma of malt does not disappear. An addition of pure $H^2 O^2$ assists somewhat the action of the air.

When storing at ordinary temperature, the development is only completed after a long time, by storing at a warm temperature it is considerably accelerated, but in this case, with warm storage below 50° C. as is customary with the wines of the south, hurtful changes of flavor and aroma take place, notwithstanding the use of filtered air, unless an addition of an antiferment such as antizymoticis be used, probably on account of defective after fermentation.

This may be prevented by storage at a temperature as a rule not below 50° C. After warm storage, the maturing is effected at ordinary temperature. The above

temperature excludes the use of wooden receptacles, while the use of glass receptacles offers various difficulties, these are avoided by the use of enamelled or silver plated metal vessels with covers. In order to prevent the escape of alcohol and ether vapours any suitable packing may be employed between the vessel and the cover.

The vessel or the cover should have a closeable opening, for the introduction of air or for taking samples. The lower part of the vessel, which is filled to a considerable extent with the beverage, is immersed in fluid or air heated to a considerable degree, so that vapours are given off, which however condense upon the surface of the upper part of the vessel, which is in contact with colder air.

Dated this 15th day of August 1890.

ABEL & IMRAY,
Agents for the Applicant.

COMPLETE SPECIFICATION.

A New Beverage.

I, FRIEDRICH SAUER, of 35[I] Kolonnen Strasse, Schoneberg near Berlin, Germany, Doctor of Philosophy, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :—

My invention relates to the production of a beverage fermented by means of wine yeast which I term "malt wine" prepared principally from malt wort and a description of sugar which is readily fermented by wine yeast.

Such beverage becomes by storage identical in flavour and aroma with sweet or liqueur wines.

My studies continued during several years have led me to a series of observations which scientifically are very interesting and incited me to combine the same to an industrially valuable process. After having finished numerous experiments for answering all the opposing questions and after having overcome many failures my pains in this respect have finally been rewarded by results which are of high industrial and economical importance.

Indeed I have succeeded in producing from cheap agricultural products thriving in moderate zones a beverage having the aroma and properties of a fiery wine of selected choice, or one of the south, and possessing at the same time the nourishing constituents by which malt beverages are distinguished. On account of this characteristic feature and of the principal material employed for preparing it I term this new beverage "malt wine." The process of producing it will hereinafter fully be described.

From malt I prepare first a wort at a temperature assisting, as generally known, the decomposition of the starch by diastase in the direction of the maltose formation, but causing the dextrine formation to be less. Under certain circumstances I may start the process also from maltose, producing substitutes of the malt, instead of from the latter directly.

This wort or maltose solution is set in fermentation, but this is done in order to produce the vinous character of the malt wine, not by means of any optional yeast, but solely by means of wine yeast; I have always attained the best results by making use of pure wine yeast. The source of wine yeast to be chosen is dependent, according to the experiences of Rommier, Duclaux and others upon the kind of flavour which is to be given to the description of malt wine intended.

But the maltose sugar has the property that it is not highly fermented by wine yeast, that is to say, that after having produced some percentage of alcohol it resists the decomposition by the wine yeast.

But the characteristic feature above mentioned of my malt wine requires that alcoholic strength which is shewn at least by genuine sweet wines *i.e.* 8 to 10

volumes *per cent.* This alcoholic strength can only be attained by adding a kind of sugar, which is highly fermentable for wine yeast, such as cane sugar, granular sugar or the like. This is a simple measure and easy to manipulate. By this means a beverage of 10, at the most of 12 volume *per cent.* of alcohol is obtained. By far the most sweet wines have a higher alcoholic degree, *viz.* from 12—18 volume *per cent.* In order to reach this also in the malt wine the idea naturally suggested itself before I had gained thorough experience, to put at once at the disposal of the yeast, by adding highly fermentable sugar such as grape sugar, cane sugar, invert sugar or the like, or a mixture of the same, a quantity of material answering that high alcoholic strength. But I was soon convinced that by these means several years would be necessary for attaining in the wine the above mentioned alcoholic strength, as not only the increase of yeast in the malt wort enriched in the said manner was extraordinarily weak and insufficient by itself on account of the fermentative effect, but also the fermentative activity calculated on the several yeast cells was insufficient.

Owing to this obstacle it would have been impossible to carry out my idea into practice unless I had succeeded in finding out a new way to attain my purpose.

By researches I have found that, contrary to what generally is assumed, not so much the alcohol as the readily fermentable sugar (such as maltose, grape sugar, cane sugar, and the like) when added in a larger percentage acts as a hindrance to fermentation, and for this reason I proceed, when carrying out my invention, in such a manner that I add to the malt wort, before or after its setting in fermentation by means of wine yeast, the highly fermentable sugar by degrees, that is to say, in observing certain intervals, determined by the fermentative activity of the wine yeast, or that I wait after each addition of sugar until it is converted into alcohol.

By these means it is easy to produce in a short time a malt wine of from 12 to 18 volume *per cent.* of alcohol, certainly a point of high importance for the value of my invention.

In order to avoid misunderstandings I would point out especially that this addition of sugar interrupted as stated, is not effected for rendering the beverage sweet and should not be confounded with a simple mixing and mingling, but is destined particularly for the fermentative decomposition, *i.e.* for the alcoholic fermentation, and that therefore I could only arrive at the required degree of alcohol formation in the malt wine, as it results from the preceding description by conducting experiments with the wine yeast, which way has hitherto not been known.

I am aware of course that there is still another means of increasing quickly alcoholic strength of a maltose solution; for this purpose it is only necessary to add to the wort commercial spirit.

But I would never make use of such an artifice and any product adulterated in this way would be commercially valueless, as commercial spirit can scarcely conceal itself from the attention of the real judge of wines, without mentioning the amyl alcohol injurious to health contained in said spirit; nor is it possible by mere addition of spirit to produce the aroma hereinafter more fully described, which is particular to my malt wine produced by fermentation only.

In order not to interfere with the course of the description I have not mentioned hereinbefore a process in preparing the malt wort which is very important for the quality of the result of fermentation.

It is known, that in all alcoholic fermentations, unless pure yeast and sterilised fermentative liquids be employed simultaneously, injurious by-fermentations produced by bacterias can never be entirely avoided without special precautionary measures.

My labours have taught me, that even in malt worts rich in sugar and after having attained already a considerable alcoholic strength the application of a suitable preservative means against that inconvenience is necessary as well as of estimable influence on the rapidity of the fermentation and the good quality of the

product of fermentation. Under the above stated circumstances characterizing my process, a fermentation preceding the alcoholic fermentation introduced in the malt mash or malt wort at 50° C. by lactic acid ferment, has given good results in this respect.

In addition to the advantageous action of the lactic acid on the wine yeast the said acid acts favorably also on the development of the flavour. I attained similar results in using organic acids such as citric or tartaric acids.

The wort fermented and prepared according to the preceding explanations does possess in this stage already a certain vinous character particularly with respect to the flavor, but its taste still fully indicates its origin from malt, that is to say, it still has a perceptible aroma of malt. According to the purpose aimed at there is still the problem to be solved to remove the malt aroma, or to reduce the same chemically in such a manner, that the nutty flavour well known to the judge of wines and characteristic of the fine wines of select choice or of wines of the south and of liqueur wines is given to the malt wine. In speaking here of a chemical reaction I must confess that I cannot represent this chemical process by a chemical formula although undoubtedly it is such a process, for our knowledge of the chemical nature of the aroma of alcoholic beverages is still very imperfect, as has been owned lately by the eminent chemists Fresenius and Sell; I may therefore in this case consider the senses of smell and taste as being more sensible agents than those of the chemist. But in general a correct explanation of the chemical process is of less importance than a full and clear description of the process itself and of the product obtainable by this process.

The malt aroma of the malt wine is destroyed by the action of oxygen or ozone, that is, it is reduced to another compound which is identical with the principle producing the aroma and nutty flavour of the wines of the south; but the reduction of the malt aroma to the latter principle takes places not directly but indirectly in forming an intermediate product. As first product of oxidation of the malt aroma a body is formed in the malt wine which gives the latter a characteristic flavor of almonds and only by the further action of oxygen the flavor of almonds is converted into the desired bread—or nutty flavor. It is evident from these explanations that the chemical process of the formation of aroma in the malt wine has nothing in common with the so called "aging" of spirits or liquors, because in the first place the malt bodies are wanting in the said liquors and on the other hand it is generally acknowledged that the aging of the said spirits or liquors is caused by the formation of an ester. The origin of the oxygen or the mode of its application is of no importance for the formation of the aroma in the malt wine; I have found for instance that by employing ozone and by adding peroxide of hydrogen to the fermented malt beverage the aroma in question can be produced, though in this case it is not rounded off in the same degree as in the process which I prefer and according to which I really work on a large scale.

Usually I do not make use of any chemical substances, but I submit the fermented malt wine to a storage at a temperature not below 50° C., and in admitting freely the oxygen of the air. I would remark in particular that at this temperature and simultaneous oxidation by the air I not only attain a quicker maturity of the aroma, but I avoid also, contrary to the usual storage, any after—or by—fermentation injurious to flavor; this fact is of course of the most favorable influence on the quality of my malt wine and makes the latter a beverage possessing like qualities as pure wines of the south and being agreeable and advantageous not only to sick and recovering persons but also to connoisseurs of wines.

For aromatising the malt wine in admitting air freely, I preferably employ, for storing the beverage metal barrels the interior of which is rendered capable, by suitable means, of resisting the action of acids although vessels of wood or of any other material may also be used.

Owing to the high degree of temperature to be maintained the high alcoholic strength of the malt wine would of course very soon be lost by evaporation on account of the store-vats being open for admitting air, unless peculiar precautionary

measures be taken. For this purpose I apply to the openings of the store-vats funnel-shaped or otherwise shaped condensers capable of being cooled, in this manner readily volatile ether compounds and alcohol escape into these condensers, but these vapors are condensed upon the walls of the condensers and flow back again into the store-vats. The vapors enter by this means repeatedly and lastingly in contact with the air communicating with the atmosphere above the liquid and absorb a part of the oxygen of the air and convey it into the malt wine. In this manner I attain in the short space of time of from 8 to 10 weeks a perfectly mature, clear and fiery malt wine having the desired aroma, the cheap manufacture and excellent qualities of which assure to this beverage a large sale in all classes.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I claim,

1. The herein described process of aromatising malt wine consisting in storing the same at a temperature not below 50° C., while admitting thereto ozone or atmospheric oxygen or oxygen obtained by chemical or physical means in particular from peroxide of hydrogen, substantially as hereinbefore described.

2. In the storing of malt wine referred to in the first claim the application of any suitable condensers for the purpose of condensing the volatile products of the malt wine in combination with or without admission of free oxygen or ozone, or of oxygen or ozone developed in the malt wine, substantially as hereinbefore described.

3. The process of manufacturing malt wine characterised by setting in fermentation with wine yeast a malt wort or a maltose-containing liquid and by adding by degrees one or more descriptions of sugar which is readily fermented by wine yeast for the purpose of producing a high alcoholic strength, substantially as hereinbefore described.

4. The herein described process of aromatising malt wine referred to in the third claim consisting in storing the same at a temperature not below 50° C. in admitting ozone or atmospheric oxygen or oxygen obtained by chemical or physical means in particular from peroxide of hydrogen, substantially as hereinbefore described.

5. In the storing of malt wine referred to in the third claim, the application of any suitable condensers for the purpose of condensing the volatile products of the malt wine in combination with or without admission of free oxygen or ozone or of oxygen or ozone developed in the malt wine, substantially as hereinbefore described.

6. In carrying out the process referred to in the first and third claims the introduction of a lactic acid fermentation into the malt mash or in the malt wort manufactured therefrom or in maltose-containing liquids for the purpose of preventing by-fermentations during the alcoholic fermentation and of improving the flavor, substantially as hereinbefore described.

Dated this 15th day of May 1891.

ABEL & IMRAY,
Agents for the Applicant.

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195, ALCOHOL,
Wines.